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THE BLACK FLIES OF DOMINICA

(DIPTERA: SIMULIIDAE)

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ABSTRACT—Three species of *Simulium* were found on Dominica: *S. antillarum* Jennings (= *S. wolcotti* Fox), *S. spilmani*, n. sp. (female, male, pupa, larva), and *S. tarsale* Williston (female, male, and possible pupa and larva).

The material on which this paper is based primarily was collected by Dale F. Bray, J. F. G. Clarke, R. E. Darsie, Jr., O. S. Flint, Jr., P. J. Spangler, T. J. Spilman, G. C. Steyskal, and W. W. Wirth for the Bredin-Archbold-Smithsonian Biological Survey (1956-1966).

The fauna of Dominica consists of three species, none previously reported from Dominica and only one of them a new species. All three are confined to the Antilles or adjacent Mexico.

Simulium (*Psilopelmia*) *antillarum* Jennings

Simulium antillarum Jennings, 1915, Proc. Ent. Soc. Wash. 17: 200 (♂, ♀; St. Croix, Virgin Islands and Jamaica); Smart, 1940, Trans. R. Ent. Soc. Lond. 90: 4 (♀, Jamaica, Montserrat); Floch and Abonnenc, 1946, Inst. Past. Guyane et Terr. Inini, Publ. 130: 1 (♀, Guadeloupe); Lewis, 1958, Ann. Mag. Nat. Hist. (13) 1: 729 (pupa, Jamaica).

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Simulium (Lanea) antillarum Jennings: Vargas and Díaz Nájera, 1951, Rev. Soc. Mex. Hist. Nat. 12: 150, figs. 23-27 (♂, ♀; Cuba).

Simulium wolcottii Fox, 1953, Proc. Ent. Soc. Wash. 55: 138, figs. 5, 6, 8-10 (♂, ♀; Puerto Rico). **New synonymy.**

Simulium (Psilopebmia) antillarum Jennings: Díaz Nájera, 1961, Rev. Inst. Salubr. Enferm. Trop. (Mex.) 21: 79-92, figs. 1-23, 25, 26 (♂, ♀, pupa; Mexico).

Psilopebmia antillarum (Jennings): Rubzov, 1968, Parazitologiya 2: 354, figs 1-2 (♂, ♀, pupa, larva; Cuba).

Type localities: *S. antillarum*, 1.5 miles W. of West End (Frederiksted), St. Croix, Danish West Indies [Virgin Islands]; *S. wolcottii*, Henry Barracks, near Cayey, central Puerto Rico.

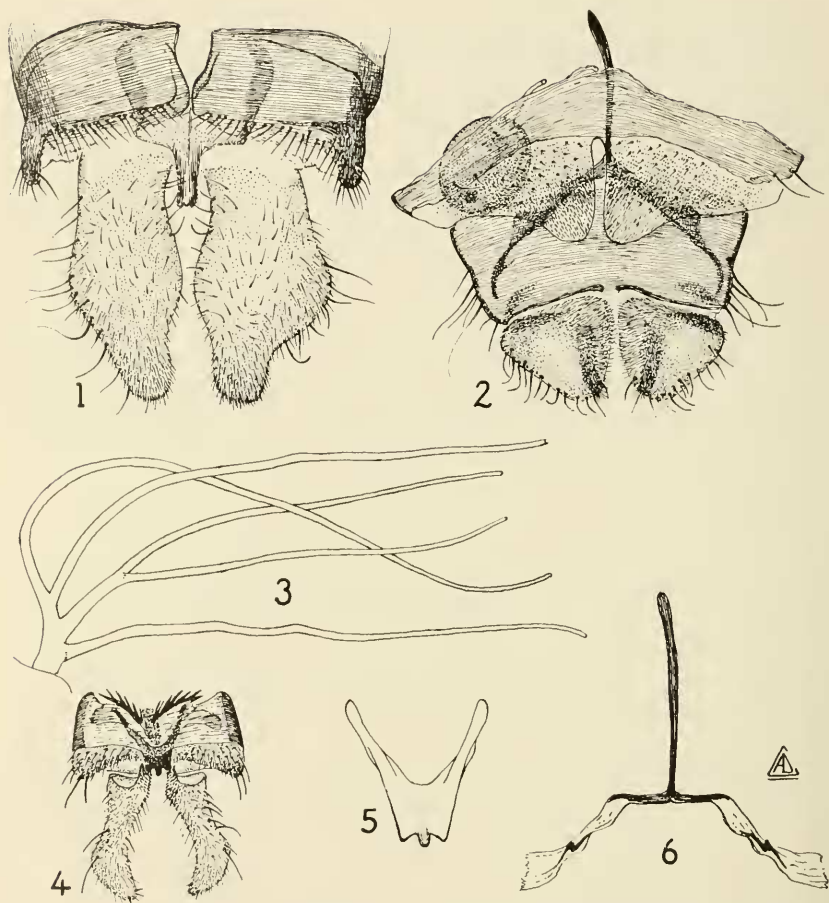
Simulium antillarum is a small species with brilliant orange thorax. It has been described and figured well by Vargas and Díaz Nájera 1951, Díaz Nájera 1961, and Rubzov 1968. Although Díaz Nájera gave characters to separate *wolcottii* from *antillarum*, I have been unable to see these differences in Puerto Rico specimens of the former, including a topotype, and I therefore synonymize the two. The type material of *antillarum* in the U. S. National Museum consists of 20 ♀♀ and 12 ♂♂ from St. Croix and Jamaica. I select a male collected November 24, 1913 at the type locality as lectotype. Much of the original material was reared from pupae and many of the slides of larval parts and pupal gills are in the collection. Subnumbers on these slides suggest individual rearing, but no adult specimens have been found with these numbers. The species ranges from Mexico (northeastern Chiapas) to Cuba, Jamaica, Puerto Rico, St. Croix, Montserrat, Guadeloupe, Dominica and Trinidad. On Guadeloupe it was reported as biting man.

Dominica records. Antrim, 1000 ft., March 12, 1 ♂, March 20, 1 ♂; March 25, 13 ♀♀ (all 1956, Clarke); Springfield, March 9, 1964 2 ♀♀ (Bray); Clarke Hall, January 22, 1965, mango flowers, 1 ♀ (Wirth); February 11-20, 1965, 1 ♀ (Wirth); March 1-10, 1965, light trap, 2 ♀♀ (Wirth); July 1964, light trap, 1 ♂ (Spilman); September 1, 1964, 2 ♂♂ (Spilman); October 3-8, 1964, 1 ♀ (Spangler); October 13, 1964, 48 ♀♀ (Spangler); Garholm Estate, February 7, 1965, 1 ♀ (Wirth).

***Simulium (Simulium) spilmani*, n. sp.**

(Figs. 3-6)

Female. Frons shiny black, nearly bare, slightly divergent above, the width at narrowest about half width of one eye as viewed anteriorly; antenna with 9 flagellomeres; scape, pedicel, and first flagellomere reddish, rest of flagellum dark with gray pilosity; clypeus dark, thinly gray pollinose, with sparse pilosity; mandibles and maxillae with the usual teeth; palpus dark; sensory vesicle of third segment about 0.4 length of segment; base of cibarium flat, unarmed. Scutum when viewed anteriorly gray pollinose with slender median black stripe, a pair of sinuous sublateral stripes broadened anteriorly and posteriorly, and a lateral black stripe; the median stripe ends anteriorly at level of narrowest space between sublateral stripes; an iridescent area on anterior portion of sublateral stripe, on lateral



Figs. 1-2. *Simulium tarsale* Will.: 1, male terminalia; 2, female terminalia. Figs. 3-6. *Simulium spilmani*, n. sp.: 3, pupal respiratory organ; 4, male terminalia; 5, male ventral plate; 6, female genital fork.

stripe, and a round spot in front of scutellum; scutellum nearly black with erect black hairs; postnotum dark with thin gray pollinosity; pleuron dark with a thin layer of pinkish pollinosity, the membraneous areas reddish; hairs of upper mesepimeron dark. Wing length 2.0 mm; veins yellowish brown, the costa with heavy black spinules; hairs on costa basad of humeral vein and on stem vein black; no hairs on subcosta ventrally; vein R bare above. Knob of halter pale yellow, the stem and base somewhat darkened. Legs: coxae with gray pollinosity; femora yellow, the posterior femur slightly darkened with yellowish hair; fore tibia dark at tip, the anterior surface mostly white; mid tibia yellow brown, slightly darkened distally; hind tibia brownish, the basal third or more white; fore tarsus black, the first three tarsomeres compressed; mid and hind tarsi with basal three fourths of

first tarsomere and basal half of second pale; calcipala reaching to pedisulcus, broad and rounded; claw weakly curved, untoothed. First abdominal tergum dark with long dark hair; second with iridescent spot on side; terga 2-5 velvety black, 6-8 shiny black. Genital fork as figured (fig. 6).

Male. Holoptic, the upper facets large, reddish brown, sharply differentiated from the small gray lower facets; clypeus with thin gray pollinosity. Scutum as viewed antero-dorsally velvety black with recumbent brown hair; a pair of oblique metallic silvery stripes on frontal declivity, a broad blue to gold (depending on light incidence) lateral stripe, and the posterior declivity shiny, gun metal blue more iridescent on anterior border, with sparse black hairs. Stem of halter with dark hair. Abdomen velvety black with tergum 2 anteriorly and laterally, and the sides of terga 5-7 with iridescent areas. Coloration of antenna, pleuron and legs as in female. Terminalia as figured (figs. 4, 5).

Pupa. Length 2.2 mm. Dorsum of head finely spiculate, of thorax glabrous; trichomes of head 2 on each side, each bifid from near base, stout, pale yellow; thoracic trichomes well developed, about 6 along anterior margin simple, a pair farther back, central, bifid; respiratory organ (fig. 3) about 1.5 mm long, with 5 filaments; filaments distinctly serrate in profile; microspicules extremely small. Description of abdomen which in this specimen is in poor condition must await better material. Cocoon simple, wall-pocket shaped, rather loosely woven with anterior margin somewhat irregular.

Larva. Length 5.5 mm. Antenna pale yellow slender, extending length of terminal two segments beyond end of fan stem. Cephalic apotome pale yellow, with pale brown darkening centrally on posterior half, behind and narrowly above eye spot, and to either side of postgenal cleft. Postgenal cleft triangular, extending about .60 of distance to hypostomium. One specimen has 3 stout setae to either side of cleft, two posterior and one anterior. Hypostomal teeth consisting of a stout central tooth, a slightly smaller corner tooth, three small intermediate teeth, and small irregular serrations laterally; sides of hypostomium with a row of setae, gradually larger anteriorly, and a few scattered small setae on disk. Sclerite of thoracic proleg about as long as distal width, somewhat narrower basally, with distal filaments in a single irregular row. Abdomen not greatly enlarged posteriorly. A pair of blunt ventral protuberances from posterior end. Posterior arms of anal sclerite darker and more slender than shorter anterior arms.

Distribution: Dominica.

Specimens examined: Holotype ♂, Clarke Hall, August 1-8, 1964, light trap (Spilman) (USNM No. 70735). Paratypes: Clarke Hall, January 8-10, malaise trap, 1 ♀; 11-20, malaise trap, 4 ♀♀; 21-31, malaise trap, 3 ♀♀; same, light trap, 4 ♀♀, 4 ♂♂; February 1-10, light trap, 3 ♀♀, 1 ♂; 21-28, light trap, 1 ♀, 3 ♂♂; March 1-10, light trap, 2 ♂♂; 21-31, light trap, 2 ♀♀, 3 ♂♂ (all Wirth, 1965); July, light trap, 1 ♂; August 1-8, light trap, 2 ♀♀, 1 ♂; 9-15, light trap, 1 ♀ (all Spilman, 1964); South Chiltern Estate, February 20, light trap, 4 ♀♀; Cabrits Swamp, February 23, light trap, 2 ♀♀; Macoucheri, March 5, at light, 1 ♂; 0.5 miles east of Pont Casse, January 27, at light, 1 ♂ (all Wirth, 1965); G'leau Gommier, March 17, 1 ♂; Antrim, 1,000 ft., March 17, 1 ♀, 2 ♂♂ (both Clarke, 1956); Freshwater Lake, February

21, 1964, 4 ♀♀ (Bray). In addition to these pinned paratypes, non-paratypic specimens in alcohol consist of 2 pupae and 24 larvae collected along the Pont Casse to Castle Bruce Road, 2 miles east along Donkey River, April 19, 1959 (Darsie) and 119 ♀♀, 31 ♂♂ collected at Clarke Hall from January to October by Flint, Spangler, Spilman, and Wirth.

Simulium spilmani is related to *S. metallicum* Rondani of Central America and northern South America but differs in several characters as follows: Female, when viewed from in front with central dark stripe not reaching anterior margin and three dark stripes not fused anteriorly; hind femur distinctly yellow; tarsal claws untoothed; inner posterior projections of genital fork long, narrow, heavily sclerotized; male with inner basal lobe of telomere round, strongly spiculate; ventral plate narrowed distally, the median lobe slender; pupal respiratory organ of five rather short filaments; microspiculation of filaments very small. In the female of *metallicum* the median dark stripe of the scutum joins the two sublateral stripes in a darkened area; hind femur usually nearly black; inner posterior portion of genital fork short, broad, weakly sclerotized; tarsal claw toothed; male with inner basal lobe of telomere flattened, not strongly spiculate; ventral plate broader distally, the median lobe broad and flat; pupal respiratory organ of six very long filaments; microspiculation of filaments strong. *S. jobbinsi* Vargas is also closely related but it differs in the scutal pattern of the female, which is as in *metallicum*, by the male terminalia, which have a broad, rounded ventral plate, and by the six rather than five respiratory filaments.

Simulium tarsale Williston

(Figs. 1, 2)

Simulium tarsale Williston, 1896, Trans. Ent. Soc. Lond. 1896: 268 (♀; St. Vincent); Smart, 1942, Proc. R. Ent. Soc. Lond. (B) 11: 48 (type study, synonymy); Floch and Abonnenc, 1946, Inst. Pasteur Guyane et Inini, Publ. 130: 3 (♀).

Simulium clavipes Malloch, 1914, U. S. Dept. Agr., Bur. Ent. Tech. Ser. 26: 40 (♀, Guadeloupe).

Type localities: *S. tarsale*, Windward side St. Vincent, W. I., 1,000 ft; *S. clavipes*, Guadeloupe, West Indies, 4,000 ft.

Female. Wing length 2.6-3.1 mm. Frons and clypeus gray pruinose, the margins narrowly whitish; front distinctly narrowed below. Scape and pedicel yellow, flagellum slightly darker. Palpus dark. Scutum dark brown with thin gray pollinosity on anterior half and three faintly indicated slender darker stripes; scutum and scutellum with abundant recumbent thin yellow hairs; erect black hairs on posterior declivity of scutum and on scutellum. Basal portion of vein R bare; subcosta with short hairs beneath. Halter yellowish brown. Coxae brownish or yellowish brown; femora dusky yellow; tibiae slightly darker; hind tibia slightly

swollen, usually with long erect or recurved hairs; tarsi black except for white basal half of first hind tarsomere; first fore tarsomere somewhat flattened and tarsomeres 2-3 of fore legs flattened, broad; fore tarsomeres 1 and 3 each with a pair of long recurved subapical setae; calcipala large; pedisulcus deep; claws short and curved, untoothed. Abdomen dark; tergum II silvery laterally and V-VIII shiny black; basal fringe yellow; hairs of posterior sterna recurved. Terminalia (fig. 2). Stem and arm of genital fork subequal, the arm with an anterolateral triangular lobe; ovipositor lobe triangular, rather large, not produced posteriorly; spermatheca slightly longer than wide, smooth.

Male. Coloration essentially as in female except that tergum II nearly entirely and narrow fore margins of terga IV-VI narrowly silvery; posterior terga not shiny. Terminalia (fig. 1). Basimere subquadrate, somewhat lengthened laterally; telomere broad and flat, slightly narrowed basally and with apical third abruptly narrowed; tip blunt with no tooth; telomere covered with long recurved dark hairs; ventral plate not strongly sclerotized; median portion heavily setose, slender, compressed, with blunt tip and a straight ventral keel; basal arms rather stout with rectangular lateral shoulders; median sclerite slender; endoparameral organ with short stout teeth.

Distribution: St. Vincent, Guadeloupe, Dominica.

Dominica records: Clarke Hall, January 8-10, malaise trap, 10 ♀♀; 11-20, malaise trap, 14 ♀♀; 21-31, malaise trap, 28 ♀♀; February 1-10, 1 ♀ (all Wirth, 1965); May 30, 1 ♀; June 7, 1 ♀ (both Steyskal, 1966); October, light trap, 3 ♀♀; October 12-18, 3 ♀♀; November 5-11, 1 ♀ (all Spangler, 1964); Freshwater Lake, February 22, 1964, at light, 1 ♀ (Bray); Antrim, 1,000 ft., March 17, 1956, 1 ♂ (Clarke); August, 1905, 1 ♀ (Busck). The last is labeled as a paratype of *clavipes* although not mentioned in the original description.

I have examined 23 specimens from Guadeloupe, including the type and 21 paratypes of *clavipes* and agree with Smart's synonymizing of *clavipes*. The subgeneric position of this species is uncertain. It has many characteristics of *Hemicnetha* Enderlein, but the short flat fore tarsomeres 2-3 and the untoothed claw are at variance.

Simulium sp.

Two pupae and a larva were collected on the Springfield Estate, July 26, 1963 by Flint. They are probably *S. tarsale*, but the imagoes are not sufficiently developed to permit positive identification. One of the pupae does show an indication of the slender black stripes on the thorax found in *tarsale*, and these immatures are also quite *Hemicnetha*-like, which supports the probable species identity. I describe them and hope that eventually the relationship of adults and immatures can be positively established.

Pupa: Length 2.9 mm. Head flat above, entirely margined by a distinct carina; along lateral and anterior margin many irregularly placed, short peglike setal bases. Scutal trichomes small, slender, pale. Respiratory organ of 8 clumped, dark fila-

ments, shorter than cephalothorax; retrorse hooklets on terga 3 and 4, and sterna 4 to 6; no tail hooks. Cocoon closely woven, the aperture antero-dorsal; a short, distinct collar anteroventrally.

Larva: Length 6 mm. Cephalic apotome yellow, darkened posteriorly, with a weak pattern of dorsal dark spots; antenna pale yellow, scarcely exceeding cephalic fan stem; gular cleft narrowly reaching base of hypostomium; hypostomium with evenly curved anterior margin; central tooth slender, rather small; all other teeth smaller; an oblique row of closely set yellow hairs on side of hypostomium; anal sclerite slender; apex of abdomen abruptly truncate ventrally in profile; no subapical ventral papillae.

NOTES ON THE GENERA *ZELE* CURTIS AND *XIPHOZELE* CAMERON
WITH SPECIAL REFERENCE TO THE SPECIES IN JAPAN¹
(HYMENOPTERA: BRACONIDAE)

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ABSTRACT—The Japanese species of the braconid genera *Zele* Curtis (Helconinae) and *Xiphozele* Cameron (Macrocentrinae) are reviewed and keys presented for their identification.

The present paper deals with the genera *Zele* Curtis and *Xiphozele* Cameron, between which the relationship is still open to discussion. On this occasion I will give a revision of the Japanese species belonging to these genera.

Subfamily HELCONINAE

Tribe ZELININI

Genus *Zele* Curtis

Zele Curtis, 1832, Brit. Ent. 9: 415. Type-species: *Zele testaceator* Curtis.

Phylax Wesmael, 1835, Nouv. Mem. Acad. Sci. Bruxelles 9: 159 (non Dahl, 1832).

Type-species: (*Rogas annulicornis* Nees) = *Zele testaceator* Curtis.

Homolobus Foerster, 1862, Verh. naturh. Ver. preuss. Reinl. 19: 256. Type-species:

Phylax discolor Wesmael.

Phylactor Reinhard, 1863, Berl. Ent. Zeitschr. 7: 348 (replacement name for

Phylax Wesmael, 1835).

For a long time the genus *Zele* was placed in the subfamily Macrocentrinae by previous authors, following the publication of Foerster's classification of the Braconidae (1862). The systematic position of

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